OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **LAKE WINNEPOCKET** the program coordinators recommend the following actions.

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The historical data (the bottom graph) show a *fairly stable* in-lake chlorophyll-a trend. The mean chlorophyll concentration actually decreased this season, however, there were noticeable algae blooms throughout the summer. Once again, the blue green algae *Coelosphaerium* and *Microcystis* were present in the plankton sample. These species may have bloomed this summer as a result of different problems occurring in the watershed (see Other Comments). If future algae blooms occur, we suggest that a sample be collected and brought to the lab in Concord for identification. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are internal and external sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows a *stable* trend in lake transparency. Mean transparency values increased from last season, and remained consistent throughout the summer. The algae blooms did not seem to affect transparency at the deepest point of the lake. There might have been a layer of algae at 8 meters, which is deep enough in the water column as to not have any affect on the Secchi disk reading. Readings were slightly lower in October as a result of wind and wave action at that time. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. These graphs show a *fairly stable* trend for in-lake phosphorus levels. There was a slight increase in epilimnetic phosphorus concentration this season. Events that occurred in the watershed likely led to an increase in phosphorus concentration (see Other Comments). Hypolimnetic phosphorus concentration was back to normal for the lake, and was relatively stable throughout the summer. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

<u>OTHER COMMENTS</u>

- Lake Winnepocket was plagued with various problems this summer. The Outlet was nearly filled in by the erosion of sand and silt from Pond Hill Road. Numerous construction projects were occurring and a vast area above Boxlet Inlet was being logged. Please be sure to contact us with any further problems in the future.

- A new site, West End Village, was sampled in July this summer. The site was tested due to construction occurring near the shore. The results for pH, conductivity, and phosphorus were typical for tributary water, and indicate that the construction was not causing a problem at that time. The phosphorus result was less than 5 ìg/L (Table 8). The NHDES Laboratory Services adopted a new method of reporting total phosphorus this year and the lowest value that can be recorded is ‘less than 5 µg/L’. We would like to remind the association that a reading of 5 µg/L is considered low for New Hampshire’s waters.

- Phosphorus and conductivity were elevated in the End of Lake Inlet in October this season. Monitor’s noted that water flow was low at that time. Low flow conditions can cause nutrients to accumulate, which can raise conductivity and phosphorus readings.

- Dissolved oxygen was approaching the critical level of 1.0 mg/L two meters off the bottom. As stratified lakes age, oxygen is depleted in the lower layer by the process of decomposition. Once oxygen is depleted below the critical level of 1.0 mg/L, phosphorus normally bound to the sediments is released into the water column. Oxygen has not reached the critical level yet, however we recommend scheduling the annual lake visit in August next season to determine if oxygen is depleted further by that time.

- There was a spike in the percent saturation of dissolved oxygen at 7 and 8 meters. Oxygen was saturated above 100%, which often indicates a layer of algae at that depth. Algae release oxygen during the daytime as a product of photosynthesis. Algae are often found well below the surface of the lake because they are sensitive to UV light. They tend to concentrate at a depth where sunlight is sufficient enough for photosynthesis and nutrients are available. The plankton haul was taken from 6.5 meters and most likely would not represent the majority of algae at 7 and 8 meters. The blue-green algae *Coelosphaerium* and *Microcystis* were found in small amounts in the plankton sample. Blue-greens tend to be more sensitive to sunlight and probably were the algae that caused the spike in oxygen saturation in the water column.

NOTES

- Monitor's Note (6/29/00): Washouts and erosion of class IV proportion of Pond Hill Road have deposited a large amount of silt and sand close to lake Outlet culvert. 1-2 acres on Eastern shore were clearcut in the fall on 1999 to within 15-20 feet of the shoreline. Steep slope, potential erosion problem. 80 acres to the West of lake currently being heavily logged. Established 500 feet from shore, but part of watershed feeding lake Inlet. Puffy green water plant seems unusually abundant and prosperous.

- Monitor's Note (7/28/00): More turtles. Blooms of algae. Loons, merganser. 80 acres logging up near Boxlet Inlet; 5 or 6 new homes, lots of construction; no known silt fences. Skipped Lake Road Inlet. Sampled where some new construction is: West End Village. Major erosion at outlet/boat launch just this spring. Where the culvert is, sand from road is filling in. Culvert and water: 2' water used to be, now sand.

- Monitor's Note (10/3/00): Minimal flow at lake Inlet. House under construction on west shore, no evident erosion controls. Extensive summer logging on Inlet watershed. Secchi disk reading difficult due to wind and wave conditions.

USEFUL RESOURCES

Soil Erosion and Sediment Control on Construction Sites, WD-WEB-12, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

2000

A Guide to Developing and Re-Developing Shoreland Property in New Hampshire: A Blueprint to Help You Live By the Water. North Country RC&D, 1994. (603) 527-2093.

What Can You Do To Prevent Soil Erosion?, WD-BB-30, NHDES Fact Sheet. (603) 271-3503 or www.state.nh.us

Comprehensive Shoreland Protection Act, RSA 483-B, *WD-BB-35*, NHDES Fact Sheet. (603) 271-3503 or www.state.nh.us

Lake Protection Tips: Some Do's and Don'ts for Maintaining Healthy Lakes, *WD-BB-9*, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Proper Lawn Care Can Protect Waters, WD-BB-31, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Phosphorus in Lakes, WD-BB-20, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Vegetated Phosphorus Buffer Strips, NH Lakes Association pamphlet, (603) 226-0299 or www.nhlakes.org

Erosion Control for Construction in the Protected Shoreland Buffer Zone, WD-BB-30, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

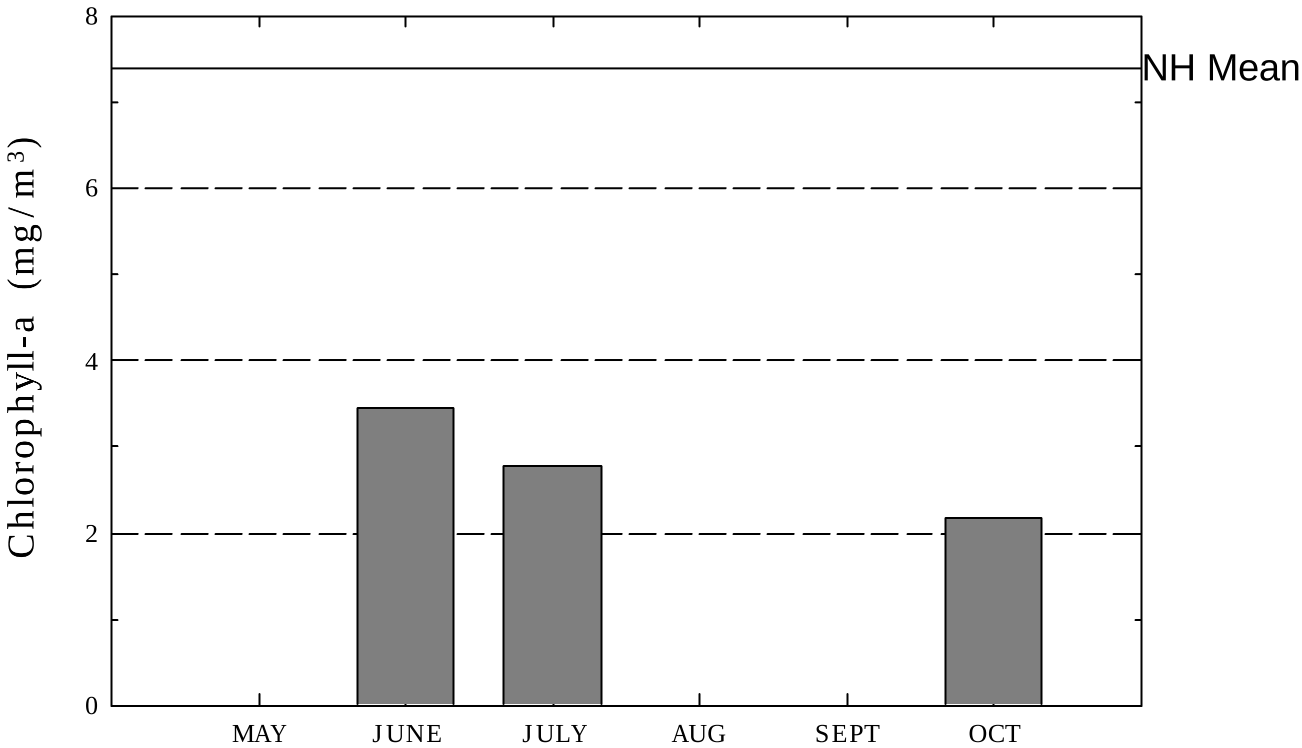
Nonpoint Source Pollution and Stormwater Fact Sheet Package. Terrene Institute. (800) 726-5253, or www.terrene.org

Best Management Practices to Control Nonpoint Source Pollution: A Guide for Citizens and Town Officials, *NHDES-WD 97-8*, NHDES Booklet, (603) 271-3503

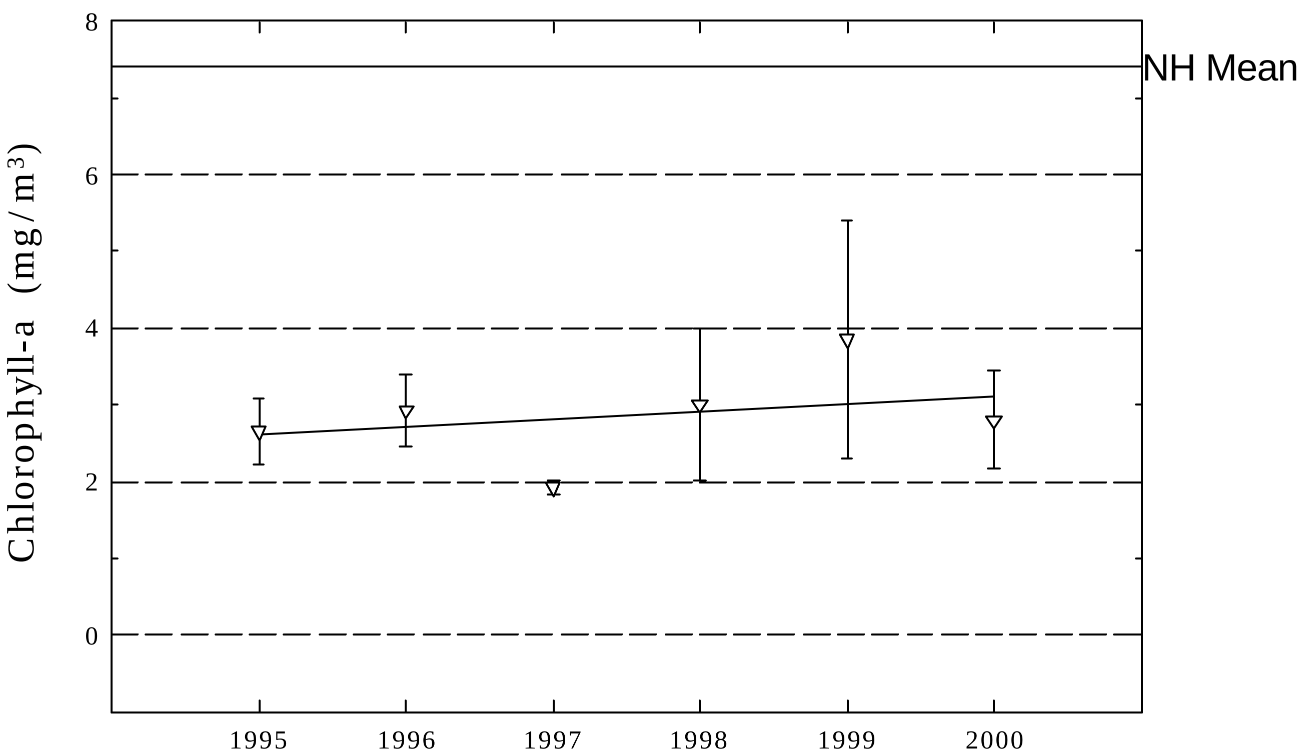
The Blue Green Algae. North American Lake Management Society, 1989. (608) 233-2836 or www.nalms.org

Lake Winnepocket

Figure 1. Monthly and Historical Chlorophyll-a Results



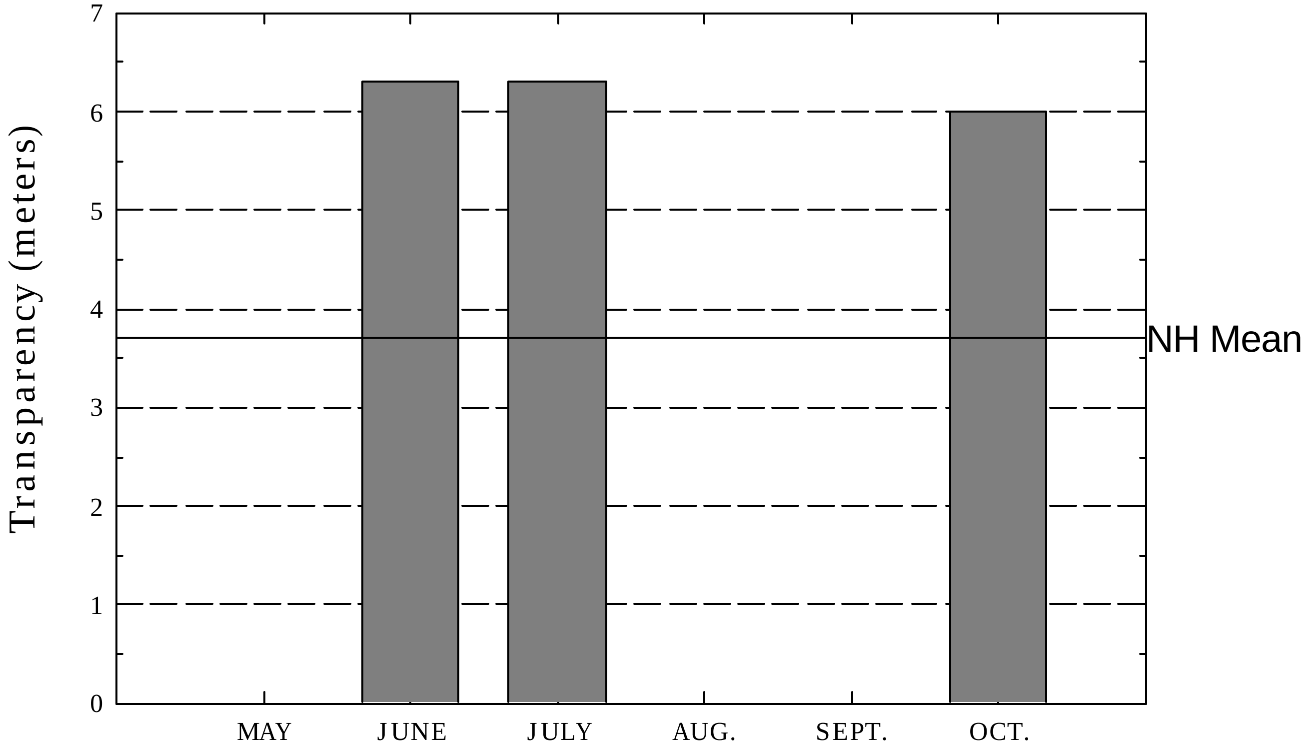
2000 Chlorophyll-a Results



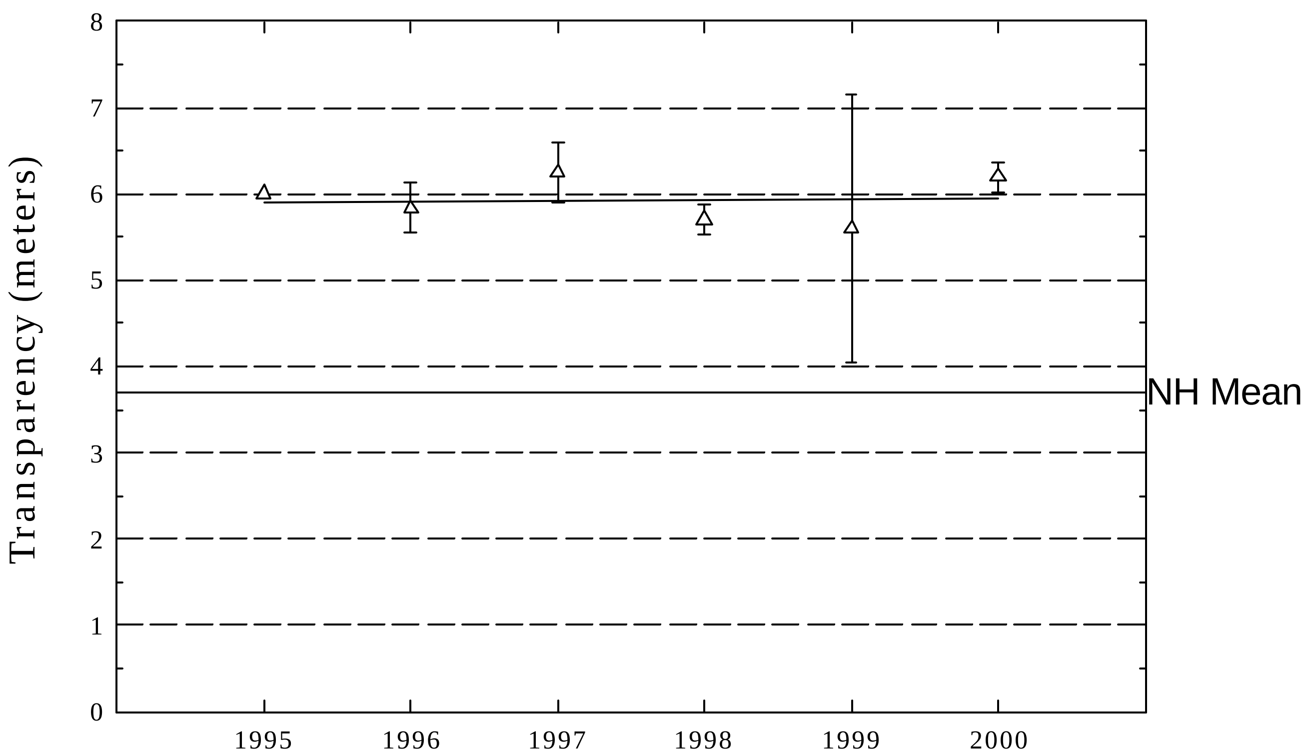
Historical Chlorophyll-a Results

Lake Winnepocket

Figure 2. Monthly and Historical Transparency Results



2000 Transparency Results



Historical Transparency Results

Lake Winnepocket

Figure 3. Monthly and Historical Total Phosphorus Data.

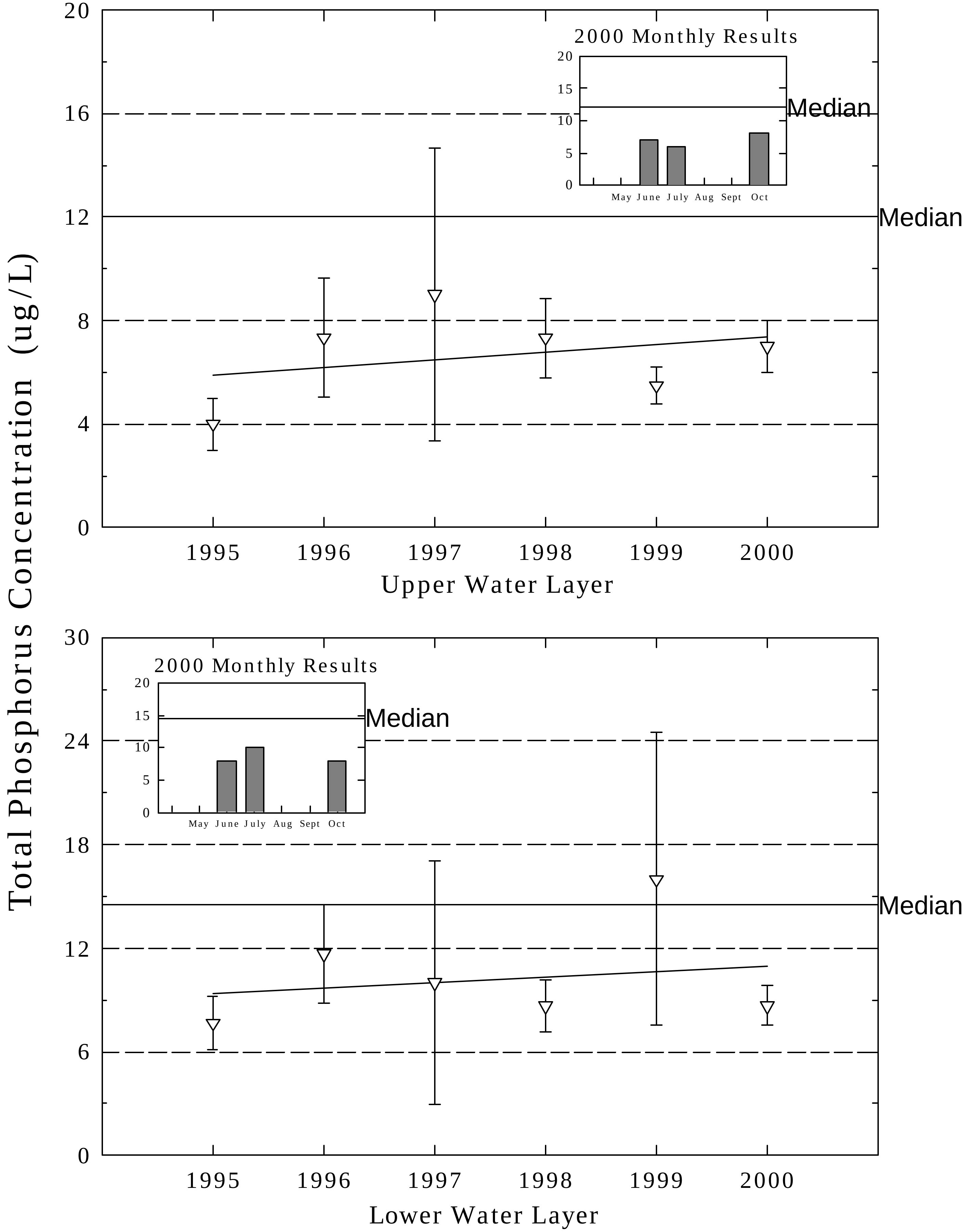


Table 1.

WINNEPOCKET, LAKE
WEBSTER

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1995	2.35	2.96	2.65
1996	2.58	3.46	2.93
1997	1.85	1.99	1.92
1998	2.04	4.03	3.00
1999	2.75	4.95	3.96
2000	2.18	3.46	2.64

Table 2.

WINNEPOCKET, LAKE

WEBSTER

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
06 / 30 / 1995	CHRYSOSPHAERELLA	60
	DINOBRYON	31
	UROGLENOPSIS	5
07 / 19 / 1996	CHRYSOSPHAERELLA	35
	DINOBRYON	35
	ASTERIONELLA	23
07 / 09 / 1998	DINOBRYON	65
	RHIZOSOLENIA	13
07 / 30 / 1999	CHRYSOSPHAERELLA	23
	ASTERIONELLA	19
	RHIZOSOLENIA	15
07 / 28 / 2000	ASTERIONELLA	36
	RHIZOSOLENIA	16
	CHRYSOSPHAERELLA	16

Table 3.

WINNEPOCKET, LAKE

WEBSTER

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
1995	6.0	6.0	6.0
1996	5.5	6.0	5.8
1997	6.0	6.5	6.2
1998	5.5	5.8	5.7
1999	4.5	6.7	5.7
2000	6.0	6.3	6.1

Table 4.

WINNEPOCKET, LAKE
WEBSTER

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
BOXLET INLET				
	1995	6.90	6.93	6.91
	1996	6.42	6.83	6.56
	1997	6.74	7.04	6.86
	1998	6.80	6.82	6.81
	1999	6.49	6.82	6.66
	2000	6.82	7.00	6.88
END OF LAKE INLET				
	1999	6.60	6.85	6.71
	2000	6.97	6.97	6.97
EPILIMNION				
	1995	6.85	7.04	6.92
	1996	6.74	6.94	6.81
	1997	6.54	7.00	6.71
	1998	6.68	7.18	6.86
	1999	6.32	6.95	6.57
	2000	6.85	6.88	6.86
HYPOLIMNION				
	1995	6.13	6.61	6.30
	1996	6.00	6.16	6.05
	1997	6.04	6.39	6.18
	1998	6.04	6.34	6.20
	1999	6.07	6.32	6.21
	2000	6.13	6.30	6.21

Table 4.

WINNEPOCKET, LAKE
WEBSTER

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
METALIMNION				
	1995	6.76	7.05	6.91
	1996	6.07	6.54	6.25
	1997	6.29	6.96	6.51
	1998	6.30	6.75	6.46
	1999	6.34	6.83	6.56
	2000	6.52	6.83	6.66
OUTLET				
	1995	6.36	6.67	6.54
	1996	6.32	6.98	6.54
	1997	6.53	6.62	6.57
	1998	6.35	6.69	6.49
	1999	6.47	6.82	6.59
	2000	6.54	6.88	6.72
WEST WIND VILLAGE				
	2000	6.81	6.81	6.81

Table 5.

WINNEPOCKET, LAKE

WEBSTER

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
1995	5.10	5.50	5.30
1996	3.90	6.40	5.30
1997	4.60	5.00	4.80
1998	4.70	5.30	5.07
1999	5.00	5.70	5.27
2000	5.50	5.80	5.60

Table 6.

WINNEPOCKET, LAKE
WEBSTER

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
BOXLET INLET				
	1995	50.8	54.2	52.5
	1996	33.9	54.6	41.7
	1997	49.9	57.7	53.8
	1998	48.6	52.7	50.6
	1999	47.2	77.2	62.0
	2000	52.6	58.3	56.0
END OF LAKE INLET				
	1999	54.1	56.6	55.3
	2000	56.5	71.4	64.0
EPILIMNION				
	1995	50.0	50.7	50.4
	1996	49.1	51.9	50.0
	1997	48.3	48.6	48.4
	1998	49.6	50.3	49.9
	1999	52.9	56.3	54.8
	2000	56.6	58.4	57.3
HYPOLIMNION				
	1995	50.1	50.6	50.2
	1996	49.0	52.6	51.0
	1997	47.2	47.9	47.5
	1998	49.2	50.5	49.7
	1999	55.8	63.3	59.3
	2000	56.3	65.4	59.6

Table 6.

WINNEPOCKET, LAKE
WEBSTER

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
METALIMNION				
	1995	44.9	50.0	48.2
	1996	48.8	50.8	49.8
	1997	47.0	48.6	47.8
	1998	48.7	49.9	49.3
	1999	53.7	55.2	54.2
	2000	55.6	58.3	56.7
OUTLET				
	1995	50.4	51.1	50.6
	1996	51.0	53.0	52.0
	1997	48.1	48.9	48.5
	1998	50.3	51.7	51.0
	1999	54.8	56.3	55.6
	2000	56.4	58.0	57.1
WEST WIND VILLAGE				
	2000	57.0	57.0	57.0

Table 8.

WINNEPOCKET, LAKE
WEBSTER

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
BOXLET INLET				
	1995	24	24	24
	1996	19	27	22
	1997	7	30	18
	1998	22	58	40
	1999	6	17	12
	2000	12	16	14
END OF LAKE INLET				
	1999	4	4	4
	2000	6	15	10
EPILIMNION				
	1995	3	5	4
	1996	6	10	7
	1997	5	13	9
	1998	6	9	7
	1999	5	6	5
	2000	6	8	7
HYPOLIMNION				
	1995	6	9	7
	1996	10	15	11
	1997	5	15	10
	1998	7	10	8
	1999	10	22	14
	2000	8	10	8

Table 8.

WINNEPOCKET, LAKE
WEBSTER

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
METALIMNION				
	1995	5	15	9
	1996	6	11	8
	1997	6	7	6
	1998	8	19	12
	1999	5	11	8
	2000	6	9	7
OUTLET				
	1995	4	7	5
	1996	8	15	11
	1997	4	8	6
	1998	5	16	10
	1999	5	19	10
	2000	6	10	7
WEST WIND VILLAGE				
	2000	< 5	5	5

Table 9.

WINNEPOCKET, LAKE
WEBSTER

Current year dissolved oxygen and temperature data.

Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
July 28, 2000			
0.1	22.9	8.5	98.7
1.0	22.6	8.5	98.3
2.0	22.4	8.5	98.0
3.0	22.4	8.5	97.7
4.0	22.3	8.5	97.8
5.0	22.2	8.5	97.7
6.0	22.1	8.4	96.0
7.0	19.6	9.8	107.0
8.0	14.6	11.9	116.8
9.0	12.2	5.4	50.2
10.0	10.9	4.4	39.9
11.0	10.4	3.8	34.3
12.0	10.2	3.0	26.9
13.0	10.0	2.3	20.6
14.0	9.9	1.9	16.7
15.0	10.0	1.7	14.8

Table 10.

WINNEPOCKET, LAKE

WEBSTER

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
June 30, 1995	14.5	10.0	3.0	27.0
July 19, 1996	18.0	8.8	1.5	13.0
July 9, 1998	18.0	8.0	5.0	42.0
July 30, 1999	17.0	9.9	1.2	10.3
July 28, 2000	15.0	10.0	1.7	14.8

Table 11.

WINNEPOCKET, LAKE
WEBSTER

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
BOXLET INLET				
	1997	0.3	1.1	0.7
	1998	1.1	5.7	3.4
	1999	0.4	0.6	0.5
	2000	0.2	0.7	0.5
END OF LAKE INLET				
	1999	0.3	0.4	0.3
	2000	0.1	0.4	0.3
EPILIMNION				
	1997	0.2	0.2	0.2
	1998	0.3	0.5	0.4
	1999	0.3	0.4	0.4
	2000	0.2	0.2	0.2
HYPOLIMNION				
	1997	0.2	0.2	0.2
	1998	0.4	0.5	0.5
	1999	0.4	2.5	1.2
	2000	0.2	0.6	0.4
METALIMNION				
	1997	0.2	0.3	0.3
	1998	0.3	0.5	0.4
	1999	0.3	0.7	0.5
	2000	0.3	0.3	0.3
OUTLET				
	1997	0.3	0.3	0.3
	1998	0.3	2.1	1.2

Table 11.

WINNEPOCKET, LAKE

WEBSTER

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
	1999	0.3	0.7	0.5
	2000	0.2	0.4	0.3
WEST WIND VILLAGE				
	2000	0.2	0.2	0.2